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tion of some of our time-honored and fundamental conceptions. It opened up to us the atom, the *ne plus ultra* of the chemist, and showed within it a system of revolving bodies far more numerous and complicated than the solar system. Already our knowledge of these electrons, whose existence was unsuspected a few years ago, is greater than our knowledge of the molecules, and we can study them with much more facility because they carry charges of electricity which betray their presence in the minutest number. A single electron can be detected while the smallest number of gas molecules which can be discerned with the spectroscope is about ten million million.

The tendency of the times is to extend the atomic theory into new fields, to speak of atoms of electricity, of energy and of light. The corpuscle, the smallest known particle of negative electricity, is only one seventeen-hundredth the mass of the atom of hydrogen. The smallest unit of positive electricity, on the other hand, seems to be equal to the atom of hydrogen. It is possible, however, that this positive particle may be a complex of many positive and negative particles and that the individual positive corpuscle when isolated as the negative one has been may prove to be equally minute.

The discovery of the enormous stores of energy compact in the atom in the form of the electrostatic potential energy of its negative corpuscles gives one a peculiar sensation. It is like finding out that there is a barrel of gold and a dynamite bomb in the cellar of the house. But a gram of hydrogen would be capable of developing more heat than the burning of thirty-five tons of coal. Since energy is wealth we have everywhere enough to make us all rich "beyond the dreams of avarice" forever, but we have no way of unlocking this storehouse. This may be fortunate for us since Professor J. J.

Thomson, of Cambridge, says, "if at any time an appreciable fraction were to get free the earth would explode and become a gaseous nebula." Professor Thomson, in compensation for our natural disappointment at being frightened off these presences by such a terrifying spring-gun, reminds us that on every sunny acre 7,000 horse-power of radiant energy from our solar dynamo is going to waste and that it is neither impossible nor dangerous to utilize it.

THE LITTLE ENEMIES OF MAN

EARLY in the history of the human race man learned how to conquer the mastodon. He has yet to learn how to master the microbe. Whales and elephants are now almost extinct, but mice and flies still increase and multiply, and the bacteria, smallest and most dangerous of all, find new ways of attacking us. It is only within the last few years that man has learned which his greatest enemies are, and he has not yet found weapons against them. The explorer in tropical jungles used to fear the lions, tigers and pythons; now he protects himself most carefully against the mosquitoes and tsetse. Mars has afflicted the human race less than Beelzebub.

Although we theoretically accept the conclusion of science that a man's foes are those of his own household, we are not yet aroused to the necessity of waging war in earnest against them. We have a secretary of navy and we give him millions for defense, but we have no secretary of sanitation, though that is a more necessary office. It is quite improbable that any American will be killed by an invading army this year, but our land is invaded by millions of mosquitoes and flies armed with deadly weapons and certain to slaughter thousands. Years of study and experimentation will be necessary before we learn how to fight our insect foes, but already enough has been done to show

what can be accomplished if we go about it in the right way. Many of the sanitary measures of the past we now know to be crude, clumsy and misdirected, yet they are fixed in the popular mind and remain on our statute books. People still talk about the dangers of miasma and sewer gas, and think a deodorizer is a disinfectant.

We are far from acting up to our lights. The housewife wages war against vermin, but she does not realize that they are more dangerous than trolley cars. She gets more excited at the discovery of a moth than a fly, although the former only attacks clothing, not its contents. We have drain pipes in our walls to carry off disease, but beside them are conveniently arranged passages by which roaches can carry diseases from flat to flat, so that everybody has a fair chance to catch whatever is going. Our windows are hospitably open to the malarial mosquito and typhoid-bearing fly. Over our clothing on the street cars crawl unmentionable insects carrying unmentionable diseases. In the fashionable hotel and restaurant the napery and porcelain are immaculate and the waiters are scrupulous; what goes on behind the screen and in the market is another story. We have got past the days when we kept the pig in the parlor, but we still keep the dog in the parlor, which is quite as bad. On the street we see the pet dog gnawing a decaying bone and nosing the foulest spot to be found, and a moment later he is cuddled in the arms of his fair and fastidious mistress and licking her cheek. We have yet to realize that it is the dogs which are not mad that are the more dangerous. They injure more people by their kisses than their bites.

In primitive days man had to associate with the lower animals. He needed dogs and horses and he very properly made friends of them. He is now learning how to do without

them, and he should, like a snob who has risen in the world, exclude them from his circle of intimates. The house is not intended for a zoological garden. Insects and animals may be our worst enemies.

THE BIRTHPLACE OF THE EELS

THE final chapter in the life story of the eel has been written by the Danish expedition under Dr. Joh. Schmidt, which has recently returned to Copenhagen. The breeding grounds have been found between the Bermudas and the Leeward Islands, where the sea reaches a depth of more than a mile.

The origin and mode of reproduction of the common eel have been for centuries a matter of speculation. It has long been observed that large eels migrate toward the sea in autumn and that in the spring little elvers are found under stones on the seashore and ascend the streams in vast numbers. A group of small transparent salt water fishes, known as *Leptocephali*, were described in 1763, but no one guessed that they were in any way related to the eels.

In 1864, Theo. N. Gill, of the Smithsonian Institution, published the conclusion that these *Leptocephali* are the young or larvæ of the eels, and this was confirmed through direct observation by Yves Delage in 1886. Beginning the following year, Professor Grassi made careful studies of the development of the eel in Sicily, observing the transformation of *Leptocephali* into the conger and other genera of eels, and in 1894 the larva of the common eel was discovered.

It was evident that the spawning of mature eels occurred in the sea, and now the place has been discovered by Dr. Schmidt. The European species deposit their eggs to the south and east of the Bermudas, while the American species breeds to the south and west of the islands.